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ABSTRACT

This follow-up study explored behavioral self-regulation, private speech and speech-action coordination with 72 preschoolers classified 2 years prior into two groups: those diagnosed as at-risk for Attention Deficit Hyperactivity Disorder (ADHD) and healthy controls. Children were videotaped as they completed tasks of executive functioning, speech-action coordination, and selective attention. Children's behavior at home and at preschool was measured by parental and teacher report, as was parenting style. Results indicated that over half of the ADHD group continued to show behavior problems at age 5, with 24 percent scoring in the clinical range. The contexts in which private speech emerged, the contexts in which speech-action coordination was observed, and the conditions under which such speech was helpful to the children, differed by group. Parenting style and the quality of maternal-child dyadic interaction during joint problem solving are related, both concurrently and prospectively, to children's attentional and self-regulatory difficulties. Results pose implications in terms of the need for early intervention with this population, and the need for exercising caution with intervention techniques for behaviorally at-risk preschool children that involve the use of explicitly self-instructional scripts. (JPB)

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Two-Year Follow-Up of Preschool Children at Risk for ADHD: Verbal Self-Regulation and Speech-Action Coordination

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ABSTRACT

This study is a prospective, longitudinal attempt to explore behavioral self-regulation, private speech, and speech-action coordination in a sample of behaviorally at-risk preschool children. 72 preschoolers (age M = 5.5 yrs.), who were classified two years earlier into two groups [at-risk for ADHD ("ADHDr") and a matched control group] on the basis of preschool teacher behavioral ratings, were videotaped as they completed tasks of executive functioning, speech-action coordination, and selective attention. Children's behavior at home and at preschool/kindergarten was measured from parental and teacher report, as was parenting style. 67% of the ADHDr group continued to evidence behavior problems at age five with 24% of the ADHDr group scoring in the clinical range. The contexts in which private speech emerged, the contexts in which speech-action coordination was observed, and the conditions under which such speech was helpful to the children, differed by group. Parenting style and the quality of maternal-child dyadic interaction during joint problem solving are related, both concurrently and prospectively, to children's attentional and self-regulatory difficulties. Results are discussed both in terms of the need for early intervention with this population, and the need for exercising caution with intervention techniques for behaviorally at-risk preschool children which involve the use of explicit self-instructional scripts.

INTRODUCTION / RATIONALE

- Preschool children identified by teachers as overactive, impulsive, and/or inattentive are at significant risk for developing more serious problems of behavioral self-regulation, such as attention deficit hyperactivity disorder (ADHD) during the elementary school years.

- A central goal of contemporary developmental psychopathology is understanding the factors which predict the developmental course of such at-risk children.

- An important component of behavioral self-regulation is the ability to guide one's attention and behavior with the use of self-formulated goals and plans (i.e., private speech).

- Vygotskian, sociocultural theory emphasizes the roles that children's socialization and private speech play in the development of self-regulation during the preschool years.

- School age children diagnosed ADHD a) have a history of particularly negative and controlling patterns of parent-child interaction which constrain the development of self-regulation, b) appear to be delayed in the internalization of private speech, and c) have private speech which is less related to ongoing attention and behavior, compared to controls.

- The present study represents a prospective, longitudinal attempt to explore the development of private speech, behavioral self-regulation, and speech-action coordination in a group of behaviorally at-risk preschool children.

YEAR 3 - METHOD/MEASURES

SUBJECTS

- ***72 Children in 2 Groups***

(From Winsler, Diaz, McCarthy, Bird, & Feldman, 1995 - Now Age M=5.5 yrs)

- Wide range of SES
- 79% Male
- 63% White 6% Hispanic/Latino 1% African-American
  8% Asian-American 21% Other/Mixed

- 29 At Risk for ADHD (ADHDr) (63% of original sample)
  (Children rated two years earlier by their preschool teachers as being extreme on impulsivity, inattention, and hyperactivity)

- 43 Control Group (93% of original sample)
  (Randomly selected children in the normal range on the rating scale two years ago, originally matched on classroom and gender)

MEASURES

- **Parenting Style** (Parental Authority Questionnaire - PAQ)
- **Behavior at Home** (CBCL)
- **Behavior at School** (CBCL-TRF)
- **Executive Functioning** (Trail-Making Task [TMT])
- **Selective Attention Task**
- **Speech-action coordination** - Sequential motor task involving various item phases of hammering a series (2-5 , progressive) of colored pegs on a peg board, with varying speech instructions

PHASE 1 - Instructions to hammer sequence (No speech instructions)
PHASE 2 - Simultaneous speech instruction (Say the colors while you hit them)
PHASE 3 - Anticipatory speech instructions (Say the sequence first, then hit them)

PHASE 4 - Child generated sequence - (No speech instructions given after child reports plan)

PHASE 5 - Repetitive hammering - single peg - no speech instructions (Hit this peg 'x' times)
PHASE 6 - Repetitive hammering - single peg - (Speech instructions opposite to whatever speech the child did spontaneously on PHASE 5)

YEAR 1 - METHOD/MEASURES

PROCEDURES - YR 1

Task: **Magnet board construction task in which participants copied/constructed a clown face with 24 small, colored, magnetic, geometric pieces (shapes), according to a model**

Design: **2 Sessions**

1) **Adult-child collaborative/teaching session**
   - **2 Adult-Child Conditions** (Randomly Assigned)
     a) **Mother - Child**
     b) **Experimenter - Child ("Scaffolding")**

2) **Individual Child session**

Data: **Coded Videotapes and Transcripts**

MEASURES - YR 1

Adult Speech During the Dyad Session

(Reliability = 86%)

The following 20 types of adult utterances (based on content and function of speech) were clustered into 9 groups via factor analysis - composite scores were calculated:

- **Commands**
- **Negative Corrections**
- **Direct Explanations**

- **Word Play**
- **Celebration**

- **Perceptual Questions**
- **Answer to Child Question**

- **Directive Questions**
- **Adult Plans**

- **Conceptual Questions**

- **Directives**
- **Response to Child Statement**
- **Unqualified praise**

- **Praise of the child's character**
- **Praise of the child's actions**

- **Labeling**
- **Broadcasting**

- **Praise of the task**
- **Self Evaluations**
- **Other**

Individual Task Performance

PPVT Vocabulary

YEAR 1 MEASURES (CONTINUED)

Children's Individual Private Speech (Reliability = 89%)

Level 0: Other
- a) Unintelligible, incomplete, full-volume utterances
- b) Speech of unknown relevance

Level 1: Task-Irrelevant Private Speech
- a) Word play and repetition
- b) Task-irrelevant affect expression
- c) Comments to absent, imaginary, or non human others

Level 2: Task-Relevant Private Speech
- a) Describing one's activity or the task
- b) Plans and self-guiding comments
- c) Task-relevant questions and answers
- d) Task-relevant affect expression

Level 3: Partially-Internalized Speech
- a) Inaudible muttering
- b) Whispers
- c) Silent verbal lip movements

Child Speech During the Dyad Session (Reliability = 86%)

1) Imitations/repetitions of adult speech
2) Responses/answers to adult questions
3) Questions to adult
4) Independent verbalizations - Social Speech
5) Independent verbalizations - Private Speech

Children's Individual On-Task Attention (Reliability = 93%)

Each 10-sec interval of the individual session was coded from the videos as one the following on the basis of the child' eye gazes during the session:

1 = Unfocused	[Child's visual attention is on the task (pieces, model, or frame) for less than 3 of the 10-seconds in the observation interval]
2 = Moderately Focused	[Child's visual attention is on the task for at least 3, but less than 7-seconds during the observation interval]
3 = Focused	[Child's visual attention is on the task for at least 7 of the 10-seconds in the observation interval]

Adult & Child Physical Control of the Task (Reliability = 98%)

The number of 10-sec freeze frames in which children and adults were touching any of the task materials with their hands. This was calculated separately for each of the three thirds of the task (beginning, middle, end).

RESULTS

Group Differences at Year 3

1) Preschool children identified early as being impulsive/ hyperactive compared to controls, at year three, exhibited greater behavior problems at home, greater behavior problems in kindergarten, and poorer executive functioning.

2) There was a trend ($p = .06$) for the maternal parenting style of the behaviorally at-risk children to be more authoritarian/ controlling than the maternal style of the control children.

3) There were no significant group differences, overall, in children's speech-action coordination or performance on the motor task nor on the selective attention task - although the ADHDr group required more adult intervention/assistance with the selective attention task.

4) There were significant group-by-phase interactions on the speech-action coordination task in that the conditions under which speech emerged, speech-action coordination was seen, and self speech was helpful to the children, varied by group in the following way:

   - ADHDr children used more spontaneous private speech compared to controls during phases of the task that did not have specific speech instructions. The ADHDr group performed better on the motor task and showed better speech-action coordination during phases of the task that did not have specific speech instructions, compared to phases in which speech instructions were given.

   - Control children, on the other hand, used more speech compared to ADHDr children during task phases in which specific speech instructions were given. Also, the control group performed better on the motor task and showed better speech-action coordination during phases of the task that did contain specific speech instructions.

5) ADHDr children who perform better on the motor task with speech choose to use speech spontaneously 90% of the time, whereas control children who perform better with speech are just as likely to be silent (50%) as to talk to themselves during the motor task.

Differences Between Children Rated Above the Median on Behavior Problems at Year 3 (Age 5) and Those Below the Median (Regardless of original group membership)

1) High behavior problem children use significantly more private and social speech on all tasks, compared to low behavior problem children.

2) High behavior problem children show poorer executive functioning than low behavior problem children.

Stability and Change in Group Membership from Age 3 to 5

1) Two thirds (67%) of the ADHDr group continued to evidence behavior problems at year three as indicated by scores beyond the upper quartile on the CBC/TRF, with 24% of the year one ADHDr group scoring in the clinical range on these measures.

2) ADHDr children whose behavior had normalized by year three (33%), compared to those whose behavior remained problematic (67%):

    a) were younger at year one classification,
    b) more often spoke another language in addition to English, and
    c) had smaller families.

3) Control children whose behavior worsened over time (33%), compared to controls who remained problem-free at the two-year follow-up (67%):

    a) had higher (but still within the normal range) impulsivity/hyperactivity ratings at age 3
    b) showed significantly poorer selective attention, executive functioning, and speech-action coordination.
    c) were more likely to be male and to come from larger families,
    d) had mother-child interactions at year one characterized by high negativity/control and low praise, and
    e) had more permissive fathers at age 5.

CONCLUSIONS

1) Children identified at age three as being hard to manage in preschool are at significant risk for developing more serious self-regulatory problems upon entrance to elementary school.

2) Behavioral disturbances at age 5 are related to deficits in executive control, different patterns of private speech use, and poorer speech-action coordination.

3) Children behaviorally at-risk for ADHD spontaneously use private speech for self-regulation and their task performance is improved when they do so.

4) Interventions which direct behaviorally at-risk children to use specific verbal self instructions during tasks can be disruptive to children's ongoing task performance and speech-action coordination.

5) Parenting styles and the quality of maternal-child dyadic interaction during joint problem solving are related, both concurrently and prospectively, to children's attentional and self-regulatory symptomotology.

6) Prevention and early intervention are clearly needed with this easily identifiable population of behaviorally at-risk preschool children.